UNITED STATES PATENT
APPLICATION OF

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FOR

INTERACTIVE SYSTEM FOR MANAGING
QUESTIONS AND ANSWERS
AMONG USERS AND EXPERTS

Background of the Invention

This invention relates generally to interactive systems. It relates more particularly to interactive systems on the World Wide Web which are designed to be easily modifiable.

In an interactive system, a user may engage in a dialog with a system through a series of interactions with the system, and the dialog results in changes to the system's behavior. Many World Wide Web sites are interactive. In contrast to static systems, where users simply read information posted on a site, interactive web sites allow users to alter a site's contents or behavior. Interactive web sites provide a unique opportunity for interaction between users and experts in a certain field. For example, in a question and answer exchange, a user can pose questions and receive answers from an expert, using an interactive web site to facilitate the exchange.

One problem with traditional interactive web sites is the difficulty in modifying them. These systems require system administrators and technical staff to control the interaction between users and administrators. Expensive staff members have to undertake tedious and repetitive tasks, such as archiving older messages and deleting unanswered questions. Systems and methods consistent with the current invention automate these administrative tasks, freeing up staff members to concentrate on aspects of the systems that require judgment and discretion.

A problem with existing interactive systems which use experts is the lack of flexibility available to experts when answering questions. When experts can give only one answer to a question, it is difficult to change an opinion or elaborate on an answer. Systems and methods consistent with the current invention give experts a great deal of flexibility and control. Experts can add references and pictures to their answer. They can refer questions to other experts for

peer review or supplemental or alternative answers. They can post multiple answers to a single question. These capabilities help experts make their responses more accurate and complete.

Summary of the Invention

In accordance with the present invention, a method executed by a server provides answers on one or more topics from a set of experts on each topic to questions posed by users in communication with client interfaces, the server being in communication with the client interfaces and the set of experts. In such a method, a question is received at the server from a user via one of the client interfaces and routed to one of the experts selected using information provided with the question. If no information is provided with the question, then the question is posted in a location where it is accessible to the experts and a command is received from the selected expert in response to the question. That command is then executed automatically.

Another method consistent with the present invention is executed by a server and modifies the management of separate fora related to corresponding topics. According to such a method, data is received identifying a user as an authorized administrator. Next, a menu of guides is presented to the identified administrator. The guides consist of a set of choices corresponding to different aspects of a forum. After that, a selection command is received from the administrator to select one of the guides. Then, the selected guide is presented to the administrator. Finally, an action command is received from the administrator indicating actions to be taken with respect to the selected guide, and the action command is executed.

An additional method consistent with the present invention is executed by a server and manages the server. The server has a hierarchical configuration composed of different levels arranged in order of increasing generalization, the levels consisting of names with corresponding

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values. After receiving a command to retrieve the value corresponding to a given name, the hierarchical structure of the system is searched for the given name. The value found associated with the given name at the least generic level of the system is presented.

Brief Description of the Drawings

5   The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an implementation of the invention and, together with the description, explain the advantages and principles of the invention. In the drawings:

FIG. 1 depicts an information-sharing system consistent with the present invention;

FIG. 2 is a flow chart of a user interface for a system consistent with the present

10   invention;

FIG. 3 is an example of a home page which offers a user a choice of several fora;

FIG. 4 is an example of a forum page for the treatment forum as it appears at a user interface;

FIG. 5 is a flow chart depicting the steps involved with an expert's interaction with the

15   system;

FIGs. 6A-C depict a flow chart showing one implementation of an expert's interaction in detail;

FIG. 7 is an example of how an expert home page appears on an expert interface;

FIG. 8 represents the steps taken by the system to route a question to one of the experts;

20   FIG. 9 is a flow chart illustrating options available to an expert upon receiving a question;

FIG. 10 is a flow chart showing the interaction between the system and an administrator;

FIGs. 11A-J depict a flow chart showing one implementation of the administrator's interaction in detail;

FIG. 12 is an example of how an administrator's home page appears on an administrator's interface;

FIG. 13 represents the menu of guides which are stored on a server and presented by the system to an administrator;

FIGs. 14A-B illustrate an administrator's ability to edit questions and answers for content or for other reasons;

FIG. 15 is a high-level system diagram of a hierarchical configuration of levels, one way in which the current system can be implemented; and

FIG. 16 is a flow chart showing the steps for displaying the proper web page information.

Detailed Description

Reference will now be made in detail to a presently preferred implementation of the invention. Whenever possible, the same reference numbers will be used in the description and the drawings to refer to the same or similar parts.

Systems and methods consistent with the present invention allow users to obtain information on a given subject by interacting with experts on that subject. Users can get answers to their questions either by asking a question or by reviewing answers to questions that others have posed. If asked a question, an expert can either provide an answer or refer the question to another expert.

In one embodiment, users can visit a web site to have their AIDS- and HIV-related questions answered by doctors and other experts in the field. The site provides several benefits

to users. For instance, it lowers barriers between patients and clinicians, demystifies HIV/AIDS and its treatment, improves patients' quality of life, and fosters community through human connection.

The web site is divided into several fora based on subject matter within the broad topic of AIDS- and HIV-related information. Some fora have separate sections for recent questions and archived, or older, questions. Some fora further divide the archived questions into categories by subject matter. Each forum may have its own set of categories.

One possible implementation provides for dynamic management of each forum and of the system itself. If individual forum pages are properly designed, system administrators can make changes to the web site without using a low-level programming language, such as PERL, because system software automatically "manages" the questions and answers. The system itself stores questions and answers, handles categorization, makes the distinction between current and archived questions, allows creation and editing of pages, and manages the experts and their interrelationships.

Dynamic management of the system may be achieved using flexible "templates" instead of standard, fixed HTML documents to create the web pages. These templates may serve as a basis for only one page (e.g., the home page for the treatment forum) or for hundreds of pages (e.g., the layout for the question and answer pages). Templates differ from ordinary HTML pages in that they include commands that return information about parts of the system. These commands take the form of a standard interface to the low-level language (e.g., PERL) part of the system. By using these commands, administrators can change sections of the system easily, quickly, and without having to write or change low-level code.

A. System Overview

Figure 1 depicts an information-sharing system 100 consistent with the present invention. System 100 includes a number of devices such as computers 102, 104, and 106, with client interfaces, computers 108 and 110 with expert interfaces, a computer 112 with an administrator's interface, and server 114. Computers 102, 104, 106, 108, 110, and 112, and server 114 communicate via network 116. Network 116 could be, for example, the Internet, a private network, or any other suitable network. Although Figure 1 shows a specific number of devices, one skilled in the art will recognize that any number of devices could be connected to network 116 without departing from the principles of the present invention.

Figure 2 is a flow chart of one embodiment of a user interface for a system consistent with the present invention. Server 114 presents to the user a series of web pages. In response, the user makes selections via a client interface, e.g., computer 102, which are received by server 114. As shown in figure 2, the user is presented with a Q&A forum page, which offers a choice of fora, including: treatment, fatigue, oral health, infection, safe sex, viral load, mental health, mixed couples, spiritual, and workplace. Once the user selects a forum, a forum page gives the user several options, including ask a question, select a question, and select a category. If the user chooses to ask a question, a new page prompts the user to enter a title, a question, and, in some fora, an expert. If the user chooses to select a category, the user sees a list of questions and chooses which question to read. If the user chooses to select a question, the question and answer are presented to the user.

Figure 3 is an example of what the Q&A forum page can look like. It can include a header, sponsorship information, photos of experts, and a set of options corresponding to the available fora.

Figure 4 is an example of a forum page for the treatment forum as it appears at the user interface. The forum page lists the experts available in a specific forum. Experts can be available in one or more fora simultaneously. This allows users to address a panel of experts or have a more private interaction with a single expert. The forum page presents the user with options such as reading an answered question or adding a new question. These options can be unique to each forum. If the user chooses to read answered questions, server 114 can list the questions or prompt the user to specify a category of questions to list. If the user chooses to ask a question, server 114 displays a page which prompts the user to fill in a question and title. In one embodiment, fora permit a user to select an expert to receive the question.

B. Expert Interfaces

Figure 5 is a flow chart depicting the steps involved with an expert's interaction with the system. The interaction begins when the system receives a question from the user (step 502). The question is input by the user at a client interface, such as computer 102, and transmitted via network 116 to server 114. Once the question is received by server 114, the system routes the question to one of the experts (step 504) at an expert interface, such as computer 110. The system then receives a command from the expert (step 506) via the expert interface. Finally, the system executes the command (step 508) at server 114.

Figures 6A through 6C depict a flow chart showing one implementation of an expert's interaction in detail. The expert is presented with a home page, labeled "Top Level" in figures 6A-C, from which a user can select a specific question to answer, edit existing questions, or quit. As shown in figures 6A and 6B, once the expert selects a question to answer, the expert can then answer the question, refer the question, cross post the question in other fora, or add an attachment. Upon completing the chosen tasks, the expert chooses either post or delete, and is returned to the top level home page. The post command prompts the expert to verify the results and then the question is posted to the appropriate forum. The delete command deletes the question from the system.

Figure 6C shows that, to edit existing messages, the expert first chooses a forum (and category, if appropriate) and then chooses a question and answer to edit. The expert can then edit the answer, cross post the answer to other fora, or add an attachment. When finished, the expert selects the post command, which prompts the expert to verify the results and then the question is re-posted to the appropriate forum. The expert may then choose another forum or return to the top level home page.

Figure 7 is an example of how an expert home page can appear on an expert interface, such as computer 110. It can include the expert's name, a summary of the questions awaiting the expert's attention, an edit option, and a quit option. As shown in figure 7, questions can reach an expert in one of four ways: (1) unanswered questions referred by another expert; (2) previously-answered questions referred by another expert; (3) questions directed to a specific expert by a user; and (4) questions posted by a user with no expert selected. Regardless of the origin of questions, they all appear on the expert's home page. Collecting all of an expert's questions in

this way saves the expert time and effort previously spent visiting several different locations looking for questions.

Figure 8 represents the steps taken by the system to route a question posed by a user to one of the experts (step 504). The system first determines whether the user specified an expert with the question (step 802). The user could have specified an expert while inputting the question at a client interface, such as computer 102. If the user specified an expert with the question, the system routes the question to that expert (step 804) at an expert interface, such as computer 110. If not, the system posts the question in a location on server 114 which is accessible to all experts in the forum (step 806).

Figure 9 is a flow chart illustrating options available to an expert upon receiving a question. First, the expert receives the question at an expert interface, such as computer 110 (step 902). The expert is presented with a four part answer set (steps 904, 906, 908, and 910) that allows him or her to make a variety of choices in answering the question. The expert can go from any part of the set to any other part at any time. In the first part, the expert can answer the question (step 904); in the second part, he or she can assign the question to a forum and/or category (step 906); in the third part, he or she can refer the question to another expert (step 908); and in the last part, he or she can add an attachment to an answer to the question (step 910). Once the expert has completed the chosen task or tasks, he or she exits by specifying that the results be posted. The system then examines whether there was a referral or not (step 912) and whether there was any answer and, if so, whether it is the first one or a supplemental one (steps 914 and 916). Depending on what combination the system finds, it determines that it should do one of the following: simply post the question and answer (step 922), post a supplemental answer

to an existing question (step 924), refer the unanswered question (step 926), post the question and answer and refer it for a supplemental answer (step 928), or post the supplemental answer and also refer it for another supplemental answer (step 930).

A benefit of this embodiment is that real-time peer review is provided to experts. Experts in many fields rely on review by their peers to validate their opinions and research. Medical journals provide one avenue for peer review, but the publishing process of medical journals can take months. Second opinions provide another avenue for peer review, and patients frequently get a second opinion before accepting the treatment prescribed by their doctor. But, getting a second opinion can take weeks, during which the patient has to postpone treatment. Real-time peer review speeds up treatment.

Experts, including doctors, can post answers to questions and then refer them to other experts for a second (or third or fourth) opinion. Experts can also review answers given by other experts without being asked to do so. Users, including patients, can request that specific experts answer a question and then the users can read comments from other experts on those answers. Using the present invention, this entire review process can occur within hours, or even minutes.

C. Administrator Interface

Figure 10 shows the interaction, consistent with the current invention, between a system and an administrator using administrator interface 112. First, an administrator logs into the system via administrator interface 112 (step 1002). The system then presents the administrator with a menu of guides stored on server 114 (step 1004). Each guide consists of a set of choices corresponding to different aspects of a forum within the system. After presenting a menu of guides to the administrator, the system receives a command from the administrator, via

administrator interface 112, selecting a guide (step 1006). The system then presents the guide

selected to the administrator at administrator interface 112 (step 1008). Next, the system

receives an action command from the administrator, via administrator interface 112, in response

to the guide (step 1010). The system then executes the command received (step 1012). The

5   administrator can then choose, via administrator interface 112, to log out (step 1014), or be

presented with the menu of guides again, returning to step 1004.

Figures 11A through 11J depict a flow chart showing one implementation of an

administrator's interaction in detail. The administrator is presented with a home page, labeled

"Top Level," which offers several options, including: configure the system, add or configure a

10   forum, configure a group of either current or archived messages, add or configure a category, add

or configure an expert, add or delete an administrator, edit a question or answer, correct a forum

manually, view new material, or change the administrator's password.

As Figure 11A shows, when the administrator chooses to configure the system, a

configure system page is presented which contains information for the system configuration files

15   and requests new data. The administrator can choose next (to add data), cancel (to return to the

home page), or quit (to exit). The page for adding data contains a copy of existing data and the

new data. From the add data page, the administrator can choose next, back (return to previous

page), cancel (return to home page), or quit (exit). If 'next' is selected, or if no new data is being

added, the administrator is prompted to verify the page, after which the finish command makes

20   the appropriate changes and presents the home page.

As shown in Figure 11A, the process is the same for adding a forum as for configuring the system, except that instead of a configure system page, an add forum page is presented which contains forum names, expert selectors, data types and requests new data.

As shown in Figure 11B, the process is the same for configuring a forum as for configuring the system, except that instead of a configure system page, a configure forum page is presented which contains the forum name and inheritance information, and requests new data. Also, from the configure forum page the administrator can choose to delete a forum, which prompts the user to verify the selection and then deletes the forum from the system.

As shown in Figure 11C, the process is the same for configuring a group as for configuring the system, except that instead of a configure system page, the administrator first selects a group and then a configure group page is presented which contains the group data and requests new data.

As shown in Figure 11D, the process is the same for adding a category as for configuring the system, except that instead of a configure system page, an add category page is presented which contains category names, grouping choices, status choices, inheritance information, and requests new data.

As shown in Figure 11E, the process is the same for configuring a category as for configuring the system, except that instead of a configure system page, the administrator first selects a category and then a configure category page is presented which contains category data and requests new data.

As shown in Figure 11F, the process is the same for adding an expert as for configuring the system, except that instead of a configure system page, an add expert page is presented which requests expert names, forum selection, and any new data.

As shown in Figure 11G, the process is the same for configuring an expert as for configuring the system, except that instead of a configure system page, a configure expert page is presented which contains the expert data and requests any new data. Also, from the configure expert page, the administrator can choose to delete an expert, which prompts the user to verify the selection and then deletes the expert from the system.

As shown in Figure 11H, if the administrator chooses to add an administrator, an add administrator page is presented, which requests long and short names and a password. From that page, the administrator can choose add (adds the new administrator and returns to the home page), cancel (returns to the home page), or quit (exit).

As shown in Figure 11H, if the administrator chooses to delete an administrator, a delete administrator page is presented, which prompts the administrator to verify the delete command or return to the home page. Once the command is verified, the administrator to be deleted is removed from the system, and the administrator returns to the home page.

As shown in Figure 11I, if the administrator chooses to edit and question and answer, the administrator then chooses a category and a question and answer. An edit question and answer page is presented which displays the title, question, all answers and attachments, and all relevant forums and categories. The administrator can change the information or delete the question and answer. To change the information, the administrator is prompted to verify and post the question

and answer. To delete, the administrator must verify the command and then the question and

answer is deleted.

After deleting a question and answer, or after verifying a question and answer, the administrator

returns to the home page.

As shown in figure 11J, if the administrator chooses to kill a session, a kill session page is

presented which has summary information for each current session and a kill button for each.

The administrator can choose to kill a session, to cancel (return to the home page), or to quit

(exit). If the kill option is selected, the session is killed and the administrator returns to the home

page.

Figure 11J also shows that, if an administrator chooses to view additions, a view

additions page is presented which has a list of all forums. The administrator selects a forum to

view and is presented with that forum which contains flags that show documents under

construction.

Figure 12 is an example of how an administrator's home page can appear on an

administrator's interface, such as computer 112. The home page can include the administrator's

name as well as the options available to the administrator, including a quit option.

Figure 13 represents the menu of guides, stored on server 114, presented by the system to

the administrator via administrator interface 112 in step 1004. The administrator can choose to

configure the system (step 1302), add a forum (step 1304) or configure a forum (step 1306),

configure a group of either current (step 1308) or archived (step 1310) messages, add (step 1312)

or configure (step 1313) a category, add an expert (step 1314) or configure an existing expert

(step 1316). Guides are also available to allow the administrator to add an administrator (step

1318) or delete an administrator (step 1320). The administrator has the capacity to edit a question (step 1322) or edit an answer (step 1324). The administrator also has the option to correct a forum manually (step 1326). Finally, the administrator can select the guide to view new material being added to the site (step 1328) or to change that administrator's password (step 1330).

Figures 14A and 14B depict an administrator's ability to edit questions and answers content or for other reasons. The administrator, using administrator interface 112, can either select a question (step 1402) or select an answer (step 1408). If the administrator selects a question (step 1402), the administrator can then choose one of two options via administrator interface 112: (1) edit the question's title (step 1404), or (2) edit the question itself (step 1406). If the administrator selects an answer (step 1408), the administrator can use administrator interface 112 to choose from several options. The administrator can edit the title of an answer (step 1410). The administrator can also choose to edit the answer itself (step 1412). In editing an answer (step 1412), the administrator can choose to add an answer (step 1416) or add an attachment to that answer (step 1418). The administrator can also choose to edit an attachment to an existing answer (step 1414).

D. Dynamic Forum Management

Systems consistent with the present invention can interact with users, experts, and administrators through presenting a series of web pages. Web pages are made up of a number of fields. To display a web page, server 114 must locate the correct data for each field in the web page. Each field has a "name," e.g., <HEADING>, and a "value", e.g., <Answers to Treatment

Questions>. The names and corresponding values are arranged in (name, value) pairs and stored in configuration files (e.g., system.cfg).

One way in which the current system can maintain these configuration files is using a hierarchical configuration of levels. Each level is a collection of configuration files corresponding to a part of the system. To display a web page, the system searches the configuration files at each level. The information found at the lowest level is displayed. This allows the administrator to specify default settings at the highest level while customizing any part of the site by changing the (name, value) pairs at the corresponding level.

Figure 15 is a high-level system diagram of one such hierarchy. The levels are arranged in order of increasing generalization. The highest level of generalization is the system level 1502. At a lower level of generalization than the system level is the forum level 1504. At a lower level of generalization than the forum level is the group level 1506. The groups at level 1506 can be either current or archived. At a lower level of generalization than the archived groups is the category level 1508. It is also possible to have a separate expert level.

When the system is searching for the heading text to be displayed at the top of a page currently in the prevention category of the treatment forum, the system starts at the top (system.cfg) and looks for a "<HEADING>" block. The system then visits each configuration file on the way down the hierarchy (forum.cfg would next in this example). Preferably, the system would use the matching "<HEADING>" block it finds at the lowest level.

Figure 16 is a flow chart showing the steps for displaying the proper web page information. First, the system receives the name to search for (step 1601). If the expert level is specified along with the name (step 1602), the system searches for the value corresponding to the

given name at the expert level of the server (step 1604). The system then returns the value found at that level (step 1612). If the expert level is not specified, the system searches its hierarchical structure for the name and its corresponding value (step 1606). Beginning at the lowest level of generalization (step 1608), the system searches iteratively, moving to the next lowest level of generalization (step 1609) until the name is found. The system then presents the value corresponding to that name (step 1612).

If the levels are arranged in a hierarchical fashion, the administrator can change or create new pages at a certain level of the system by changing the value in the correct configuration file at that level. In addition, configuration files can correspond to each expert in the system, making it possible for the administrator to maintain settings for all experts or for each expert individually.

E. Conclusion

The foregoing description of an implementation of the invention is for illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention.